ATTACHMENT 1
OPERATIONAL TEST AND EVALUATION
CONSIDERATIONS

1. Definition of Cutback Thrust: Cutback thrust means a thrust setting that in the event of an engine failure is not less than the setting necessary to maintain the takeoff path engine-inoperative climb gradients specified for a particular alternative noise abatement procedure. These thrust settings are determined without considering the subsequent addition of thrust on the remaining engine(s) from a pilot action or an automatic thrust advance system. Thrust cutback means the act of setting cutback thrust.

2. Minimum Thrust Cutback Altitude: The setting of the cutback thrust for noise abatement purposes shall not be initiated below 400 feet AGL.

3. Reduced Thrust Takeoffs: Takeoffs using reduced thrust for the purpose of reducing engine maintenance cost should be prohibited if it causes the use of an alternative noise abatement procedure which includes a thrust cutback below 1000 feet AGL.

4. Flight Path (Pitch Angle) Change Considerations:

If a proposed procedure requires an initial pitch attitude that is greater than the normal operational pitch limit specified in the manufacturers flightcrew operating manual, an operational test and evaluation shall be required to determine whether special training and/or currency or other provisions are required. Factors that should be considered in determining whether special training or currency should be required include the following:

a. The rotation rates required to achieve the target pitch altitudes. The required rotation rates cannot exceed the values established by the manufacturer for normal flight operations.

b. Difficulty of speed control when transitioning from full power to cutback thrust during all engine operation and operations where an engine failure occurs during the transition.

c. The pilots visibility at the reference eye position and the alert eye position.

5. Thrust Setability Considerations:

a. The target cutback thrust setting should be determined (calculated) before takeoff. If an automatic thrust cutback feature is used, a minimum acceptable thrust cutback setting should be available so that the flightcrew can monitor the performance of the automatic thrust cutback feature.

b. The thrust cutback must be initiated by a single flightcrew action when the aircraft is at or above the established cutback height. (For example: manual throttle reduction or activation of a switch which initiates an automatic thrust cutback feature.)

c. If thrust cutback is accomplished by manual throttle reduction below a height of 1,500 feet, operational tests and evaluation must be conducted to determine whether a pilot of average skill can quickly (within 5 seconds), accurately, and reliably set the target cutback thrust without undue attention. During these tests, the absolute value of the mean deviation from the target setting shall be determined. This mean deviation shall thereafter be added to the target thrust settings to establish the minimum settings that can be used in actual operations.

d. If thrust cutback is accomplished by automatic devices, an operational test and evaluation shall be required to determine the following:

1). The flightcrew must be able to adequately monitor the performance of the automatic devices and such monitoring must not require an inordinate amount of flightcrew attention;

2). The thrust cutback must be smoothly, accurately, and reliably set;

3). It must be shown to be improbable that the automatic thrust cutback feature has unacceptable failure modes;

4). Any detected failure of the automatic thrust cutback system is adequately annunciated or otherwise clearly apparent to the flightcrew, and

5). The automatic thrust cutback feature must be inhibited below 400 feet AGL or a higher specified height.

e. If an automatic thrust advance system is used, an operational test and evaluation shall be required to determine the following:

1). The thrust advance is immediate and provides, without flight crew intervention sufficient thrust to maintain at least the FAR 25.111 engine-out gradients.

2). The required thrust advance setting is quickly, accurately, and reliably set.

3). It must be shown to be improbable that the automatic thrust advance feature has unacceptable failure modes.

4). That any detected failure of the automatic thrust advance system is adequately annunciated or otherwise clearly apparent to the flightcrew.

6. Aircraft controllability considerations. An operational test and evaluation shall be required to determine the following:

a. The handling qualities must be satisfactory when using thrust cutback procedures (all engines operative) in the most critical configurations, weight, and center of gravity. Any speed excursions during and after the thrust cutback must be easily controllable by the pilot and any speed loss must not exceed (V_2 + X) -5 with speeds less than (V_2 + X) -2 not to exceed 10 seconds.

b. The handling qualities must be satisfactory with a simulated engine failure in the most critical configurations, weight, and center of gravity. Any speed losses resulting from the engine failure before, during, and after the thrust cutback must be easily controllable by the pilot and any speed loss must not exceed (V_2 + X) -5 with speed less than (V_2 + X) -2 not to exceed 10 seconds.

c. The handling qualities must be satisfactory when automatic thrust advance system during the transition from a low power setting to a high power setting due to the thrust advance associated with engine failure.

d. The flightcrew workload must be satisfactory when accomplishing the thrust cutback procedure. The pilot flying should be able to perform the thrust cutback procedure without the assistance of the other pilot (pilot-not-flying not essential to the procedure).

7. Flight Guidance Considerations

a. If a flight director is used for takeoff the flight director guidance should be accurate and reliable during all foreseeable events. If it is not accurate or does not provide proper guidance during the thrust cutback procedure, it should be deactivated for takeoff. If the proposed procedure does not include the use of a flight director for thrust cutbacks below 1,500 feet, an operational test and evaluation shall be required to determine whether any special training or currency is required.

b. If an autopilot and/or flight director is used during the thrust cutback procedure, an operational test and evaluation shall be required to determine the following:

1). The guidance and/or control provided must be accurate and reliable throughout takeoff, initial climb, thrust cutback, and subsequent transition to normal climb-out.

2). The guidance and/or control provided must continue to be accurate during and after an engine failure at any point in the procedure.

3). The guidance and/or control must provide, achieve, and maintain at least the approved normal all-engine climb speed during the initial climb and thrust cutback.

4). The guidance and/or control provided must ensure that any speed losses during a transition are small and recovery to target speed is prompt. Any speed loss must not exceed (V_2 + X) -5 with speeds less than (V_2 +X) -2 not to exceed 10 seconds. A transition in this case means setting cutback thrust and pitch over or an engine failure after thrust cutback.

NOTE: If an autopilot is used during takeoff or engaged after takeoff and used during the thrust cutback procedure, the flight guidance provided (either flight director provided or non-flight director provided) must be sufficient to accurately monitor the performance of the autopilot.

8. Flightcrew Situational Awareness Considerations.

a. Alternative noise abatement procedures should include methods to enhance overall flightcrew awareness to the uniqueness of the procedure such as pre-takeoff briefings, special crew coordination call-outs, bug settings, and other operator devised methods.

b. If it has been determined that the aircraft has undetectable thrust loss or engine failure characteristics, an engine thrust loss or failure detection system shall be required.